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Examiner: AULAKH, CHARANJIT
Group A.U.: 1625

Remarks

The Examiner's comments and objections and the cited references have been carefully considered by the Applicant.

Claims 9, 10 and 12 are amended and new claims 17-21 are hereby submitted.

Claims 15-a6 are unprejudicially canceled.

Claim 9 is amended based on the original specification page 4, lines 9-11, page 2, lines 9-11, page 3, lines 19-21 and page 4, lines 27-29.

Claim 10 is amended based on the original specification page 2, lines 20-24 and page 6, lines 7-9.

Claim 12 is amended based on the original specification page 3, lines 1-3.

New claims 17-18 are based on original claims 1 and 2 and original specification page 4, lines 9-11, page 2, lines 9-11, page 2, lines 20-24 and page 6, lines 7-9.

New claims 19 and 21 correspond to original claims 7 and 8 rewritten to improve the clarity of the original formulation based on the original specification page 1, lines 9-12, page 2, lines 9-11.

New claims 20 and 22 are supported by the original specification, on page 1, lines 7-15 and page 8, lines 4-5.

Before addressing the Examiner's objections, it may be useful to outline the following:

Alq3 can be found as a *meridional* isomer (alpha-Alq3) and as a *facial* isomer. The facial isomer of Alq3 was found to be present both in the *gamma* phase and in the *delta* phase. In fact, the facial isomer was found to crystallize in two polymorphic species both showing *blue luminescence* and being the only two examples of Mq3 species containing in solid state the facial isomer.

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The present inventors have found that by heating at *atmospheric pressure* at 350-420 °C the alpha Alq3 the facial isomer can be obtained, particularly a mixture of both gamma and delta phase.

Moreover, the present inventors have found that by *suspending in an organic solvent*, particularly acetone, at ambient temperature, the gamma form is transformed completely into the delta form, always facial isomer.

Furthermore, the inventors have found that a film of meridional Alq3 by heating gives a film of facial Alq3.

In addition, the present inventors have found that at less than -10 °C the facial isomer is *stable in solution* (contrarily to previous findings showing that the facial Alq3 in solution isomerizes in the meridional Alq3) and that a thin film of facial Alq3, that is blue luminescent can be obtained by evaporation of a cold solution of facial Alq3.

The present inventors have also found that the *film of facial Alq3 is blue luminescent (blue emitting)*.

Claim Rejection - 35 USC § 112

Amended claim 9 explicitly shows that both gamma- and delta Alq3 contain the facial isomer of Alq3. In fact, as already shown in the original specification, it was found that the facial isomer of Alq3 is present both in the gamma and in the delta phase. The claimed process allows in a first step of heating at ambient pressure of the commercial alpha phase of Alq3, to obtain by a solid-solid transformation, a mixture of gamma and delta phases.

In addition, the subsequent step of the process as defined in claim 10 and claim 17 of suspending the mixture of gamma and delta Alq3 in an organic solvent allows the transformation of the gamma phase in the delta phase.

Claim 12 refers to a thin film of facial Alq3. The term "thin film" has a well known meaning as a film of few molecules thick, usually a layer of material having a thickness between 1 and 300 nm . The material in the present case is facial Alq3. Claim 12 indicates the deposition of a cold solution (less than 10°C)

on a substrate and subsequent evaporation of the solvent . The typology of the substrate used does not influence the formation of the thin film. The term substrate is intended to mean something that supports or forms a basis for something else (see also the Webster Third International Dictionary). An example is given in the original specification of a quartz substrate (page 7, lines 14-15).

Claims 19-22 refer to electroluminescent and electroactive devices such as OLEDs which are presented in the original description, in the "Background of the Invention" and defined in the references 1 to 9 cited therein. The meaning of the term electroluminescent device is known in the art as a semiconductor device that emits light as a result of electronic processes occurring within it (see also for example Angeli, F., Semiconductors Int.Dict.,1971). Moreover, the device to which claims 21 and 22 refer is clearly defined in the claim per se, as being a device suitable for charge transport and/or recombination and/or for light emission. In addition, claim 21 indicates as a step of the claimed process for forming a device, the step of providing an active layer consisting of facial Alq3. It will be noted also that the term "blue-emitting" is no more present in the claims.

It is considered that the claims 9-14 and 17-22 particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claim Rejection – 35 USC § 102

Claim 9 requests that alpha-Alq3 be heated in solid phase at atmospheric pressure to obtain the facial isomer of Alq3 in a mixture of gamma and delta Alq3. Braun et al does not disclose the transformation at atmospheric pressure in solid phase of the alpha Alq3 in the facial Alq3. What Braun et al actually disclose is that *"prior to heating, the tube was evacuated to 1 Pa ... Under this vacuum the temperature was increased .. until 400°C is reached. At this temperature sublimation is performed for four hours. After the sublimation is finished we observed three zones with different crystalline material ... region ... which showed blue fluorescence when excited with UV light (fraction 1)."*(page 9626, right column, first full paragraph). Thus, the process of Braun et al. requests the evacuation (to 1

Pa) of the tube containing the Alq3 and heating at this pressure to sublime the Alq3 source material and obtain the facial isomer mixed with the starting material in various proportions depending on the portion of the tube. The process disclosed by Braun et al. is thus a thermally stimulated process requiring sublimation, contrary to the claimed process which implies a solid.-solid transformation at ambient pressure (10^5 Pa) .

It is accordingly considered that the subject matter of claim 9 is novel over Braun et al.

It will be noted in addition that Braun et al. neither disclose the transformation of gamma-Alq3 in delta-Alq3 by suspending the mixture of gamma and delta in an organic solvent, particularly in acetone, as claimed in claims 10.

Claim 12 requires the preparation of a solution of facial Alq3 at a temperature lower than -10°C , the deposition of such a solution of facial Alq3 on a substrate and evaporation of the solvent to obtain a film of Alq3. On the contrary, Braun et al. disclose the preparation of a solution at room temperature (no mention to a temperature lower than -10°C can be found in Braun et al.) and "*note that amorphous films prepared from fraction 1 by evaporation onto substrates at room temperature did not show blue fluorescence but the usual yellowish-green emission of Alq3*" (page 9626, right column second full paragraph). Thus, neither an implicit nor an explicit indication of obtaining a film of facial Alq3 (that is a blue luminescent film) from a cold solution of facial Alq3 can be found in Braun et al.

It is accordingly considered that the subject matter of claim 12 is novel over Braun et al.

Claim 14 requests the heating of a film of meridional Alq3 at a temperature of 390-420 to obtain a film of facial Alq3. Braun et al. never disclose obtaining a film of facial Alq3. In fact, Braun et al

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only cite in the Introduction previous publications wherein electroluminescent thin films of the meridional isomer of Alq3 in crystalline or amorphous form were prepared, but do not mention heating of the thin film of meridional Alq3 to obtain a film of facial Alq3.

It is accordingly considered that the subject matter of claim 14 is novel over Braun et al.

Moreover, Braun et al. neither disclose the transformation of gamma-Alq3 in delta-Alq3 by suspending the mixture of gamma and delta in an organic solvent, particularly in acetone, as claimed in claim 17.

It is accordingly considered that the subject matter of claim 17 is novel over Braun et al.

Claims 19 and 21 refer to devices comprising a layer consisting of facial Alq3 and to a process for making a device comprising a layer consisting of facial Alq3. Neither Braun et al. nor Mori disclose any device comprising a component, as an active layer, *consisting of* facial Alq3. Particularly, More only discloses a, organic electroluminescent diode element comprising a layer of an aminoquinoline aluminium complex wherein the concentration of the facial stereostructure is greater than the concentration of the meridional stereostructure, typically a facial-rich 8-quinoline aluminum, implicitly in a mixture with the meridional stereostructure, suited for use in large display devices. No mention of an element consisting of the facial Alq3 can be found in More and no suggestion that such an element consisting of the facial Alq3 may be envisaged can be found in More.

It is accordingly considered that the subject matter of claims 19 and 21 are novel over Braun et al.

It is accordingly submitted that the subject matter of claims 1-14 and 17-22 is not disclosed in Braun et al or in More.

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It is moreover submitted that the claimed subject matter could not have been derived by the skilled person in an obvious manner from the teachings of Braun et al. and More.

In this regard, the Applicants note that:

The criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that this process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art... Both the suggestion and the expectation of success must be found in the prior art, not in the applicant's disclosure.

In re Dow Chemical, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988)

Here, no objective suggestion can be identified in the cited art to modify Braun et al. process as required by the claims.

In view of the foregoing, favorable action on the merits, including entry and approval of all amendments, reconsideration and withdrawal of each rejection and allowance of all claims is respectfully solicited.

Respectfully submitted,


Albert JOSIF (Reg. No. 22,917)

Agent for the Applicant

Date: February 21, 2006
Address: Via Meravigli 16, 20123 MILAN-ITALY
Telephone: (from USA) (011)(39)(02) 8590-7777
Telefax: (from USA)(011)(39)(02) 863-860